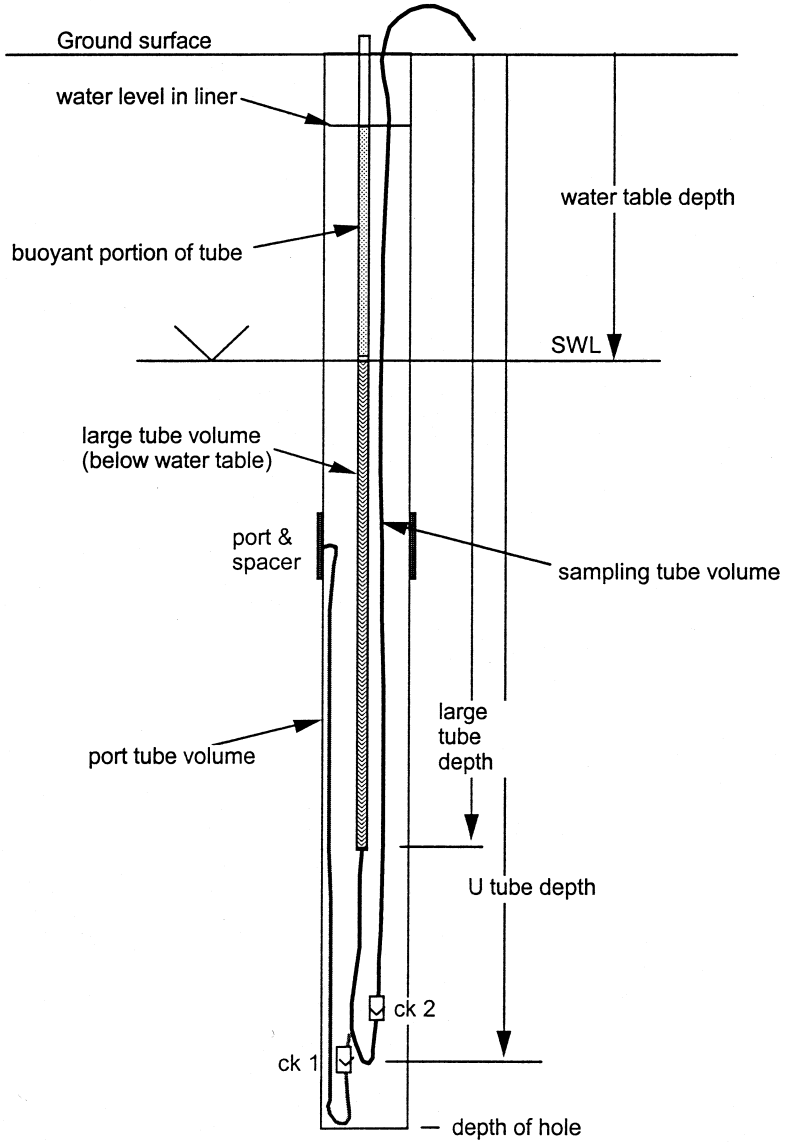
INSTALLATION AND USE OF FLUTe™ MULTI-LEVEL MONITORING SYSTEMS FOR WATER LEVEL AND WATER QUALITY MONITORING

MONITORING OBJECTIVE

Long-Term Water Level and Water Quality Monitoring in Several Bedrock Formations


Ground surface
water level in liner
water table depth
buoyant portion of tube
SWL
large tube volume
(below water table)
port &
spacer
sampling tube volume
port tube volume
large
tube
depth
U tube depth
ck 2
ck 1
depth of hole

MONITORING INTERVAL SELECTION CRITERIA

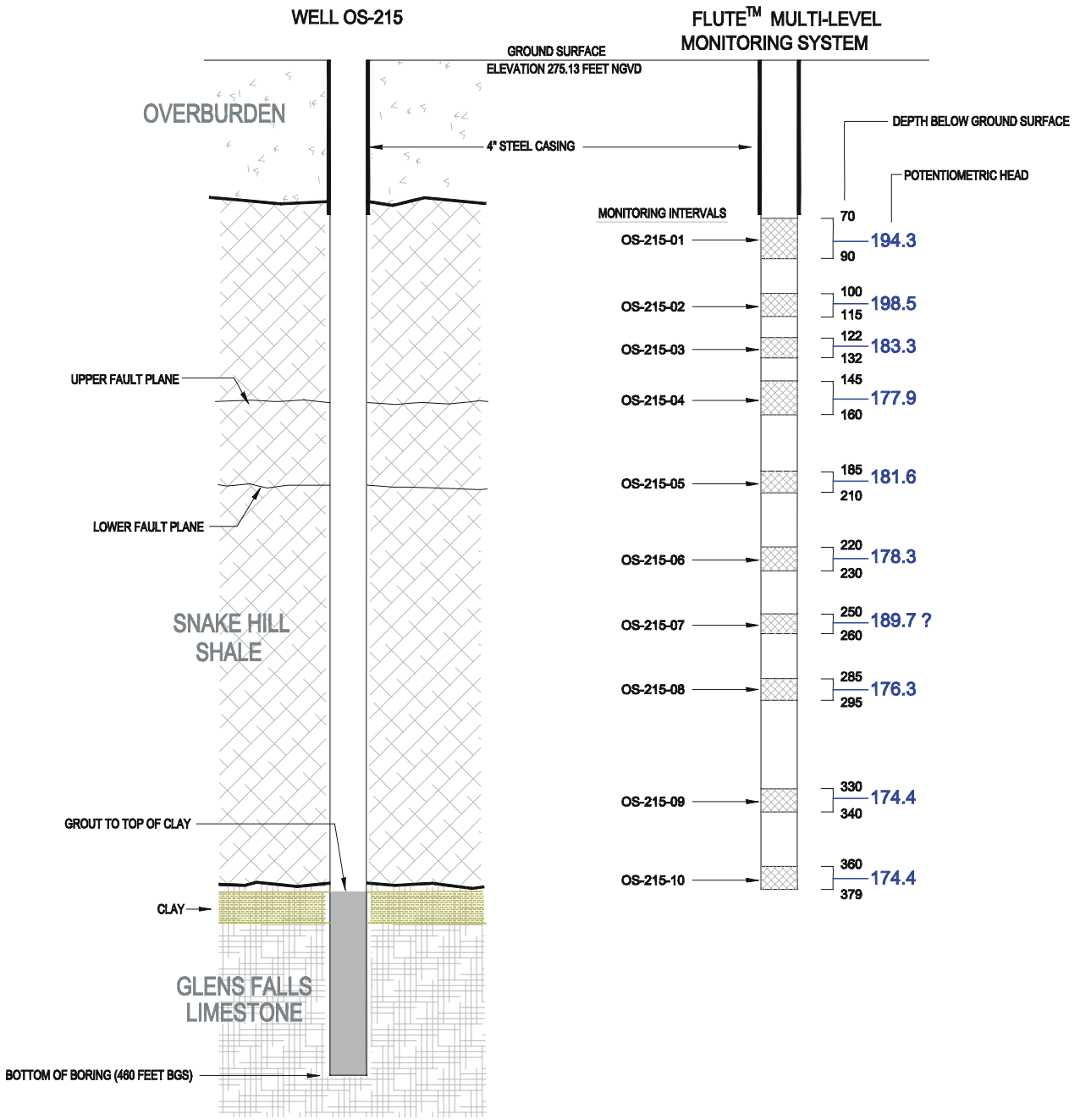
- Distributed Across Entire Borehole Length
- Known Hydrostratigraphic Features
- Water-Yielding Zones
- “Open” Fractures

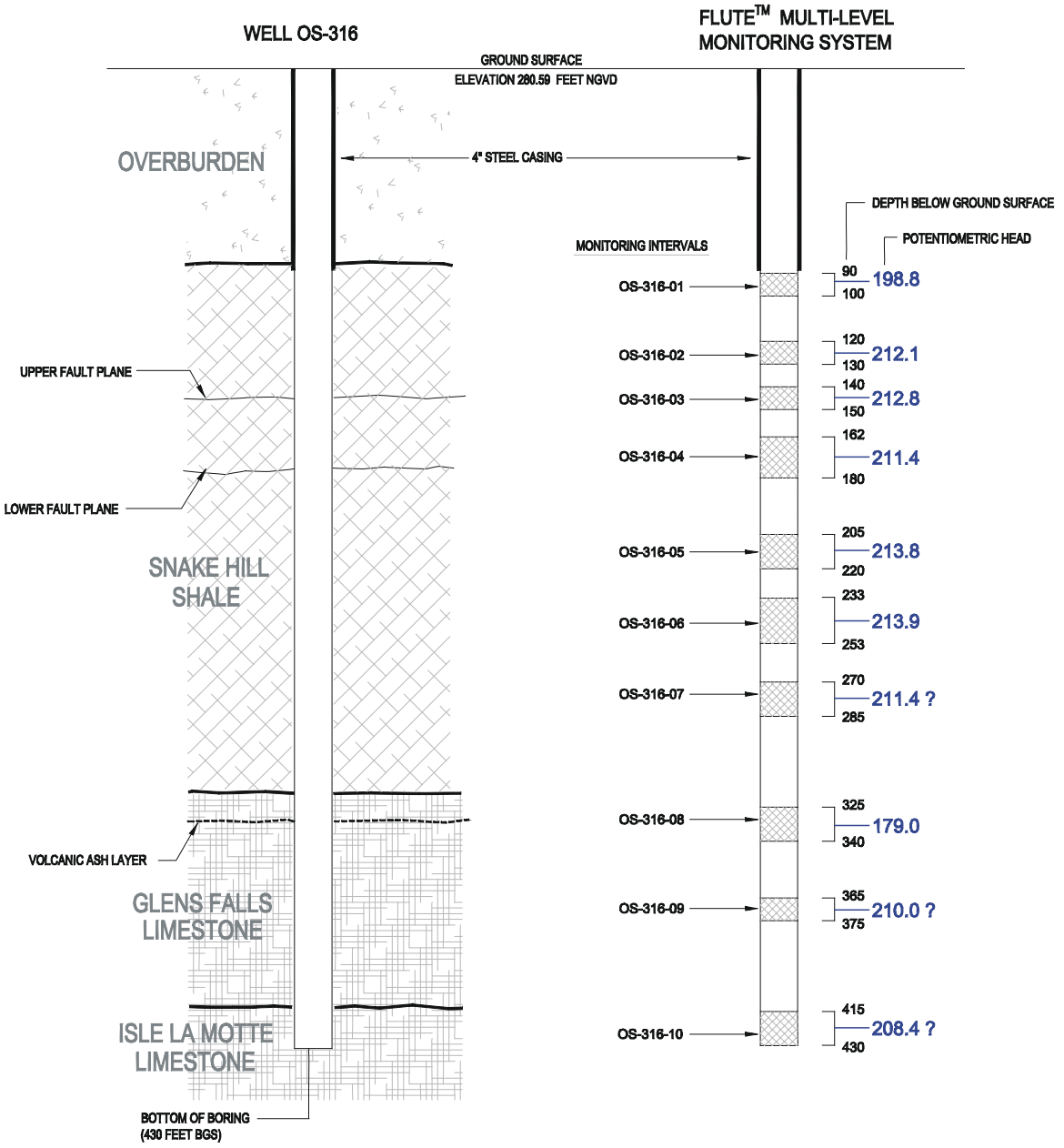
BOREHOLE LOGGING

- Continuous Core
- Caliper
- Natural Gamma
- Spontaneous Potential
- Single Point Resistivity
- Fluid Resistivity
- Temperature
- Acoustic Televiewer*
- Borehole Flowmeter*
  - stressed
  - unstressed
- Packer Development Yield*

SITE APPLICATION

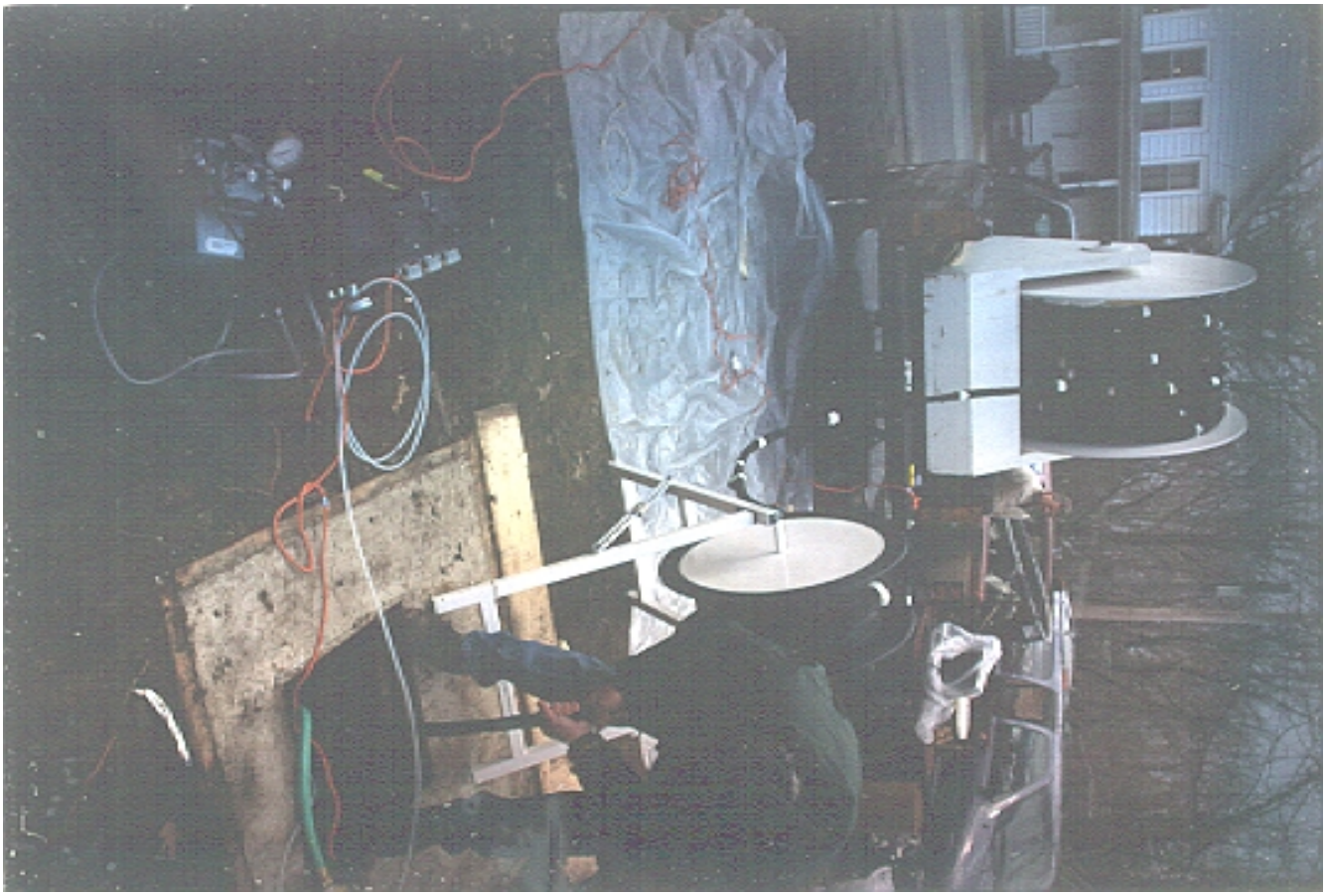
- Drill Borehole
- Well Development Using Inflatable Packers with Overlapped Intervals
- Borehole Logging
- Temporary FLUTe™ Liner
- Monitoring Interval Selection
- FLUTe™ Installation
- Water Level Measurements
- Periodic Purging of Sampling Ports
- Water Quality Sampling


WELL OS-215
FLUTE™ MULTI-LEVEL MONITORING SYSTEM
GROUND SURFACE ELEVATION 275.13 FEET NGVD
OVERBURDEN
4" STEEL CASING
DEPTH BELOW GROUND SURFACE
POTENTIOMETRIC HEAD
MONITORING INTERVALS
UPPER FAULT PLANE
LOWER FAULT PLANE
SNAKE HILL SHALE
GROUT TO TOP OF CLAY
CLAY
GLENS FALLS LIMESTONE
BOTTOM OF BORING (460 FEET BGS)
OS-215-01 70 90 194.3
OS-215-02 100 115 198.5
OS-215-03 122 132 183.3
OS-215-04 145 160 177.9
OS-215-05 185 210 181.6
OS-215-06 220 230 178.3
OS-215-07 250 260 189.7 ?
OS-215-08 285 295 176.3
OS-215-09 330 340 174.4
OS-215-10 360 379 174.4


WELL OS-316
FLUTE™ MULTI-LEVEL MONITORING SYSTEM
GROUND SURFACE
ELEVATION 280.59 FEET NGVD
OVERBURDEN
4" STEEL CASING
DEPTH BELOW GROUND SURFACE
POTENTIOMETRIC HEAD
MONITORING INTERVALS
UPPER FAULT PLANE
LOWER FAULT PLANE
SNAKE HILL SHALE
VOLCANIC ASH LAYER
GLENS FALLS LIMESTONE
ISLE LA MOTTE LIMESTONE
BOTTOM OF BORING (430 FEET BGS)
OS-316-01
90
100
198.8
OS-316-02
120
130
212.1
OS-316-03
140
150
212.8
OS-316-04
162
180
211.4
OS-316-05
205
220
213.8
OS-316-06
233
253
213.9
OS-316-07
270
285
211.4 ?
OS-316-08
325
340
179.0
OS-316-09
365
375
210.0 ?
OS-316-10
415
430
208.4 ?

GOOD NEWS AND BAD NEWS

GOOD	BAD
Multiple monitoring intervals in a single borehole	WL measurements difficult when DTW is large
Borehole can be sealed with a continuous liner	
Continuous seal between monitored intervals	Liners can be damaged
Potentially removable and reusable	Not always removable
Easily installed in permeable formations	Installed with great difficulty in less permeable formations
Can be configured for pressure transducers and sampling	Expensive when “fully” equipped
	Difficult or impossible to repair non-working parts



Right
Front